

Name: _____

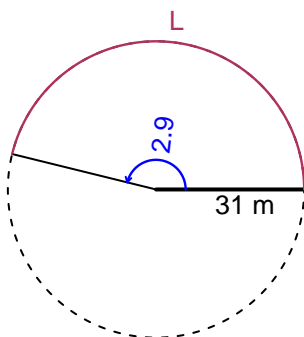
Date: _____

Trig Final (SLTN v697)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 2.9 radians. The radius is 31 meters. How long is the arc in meters?

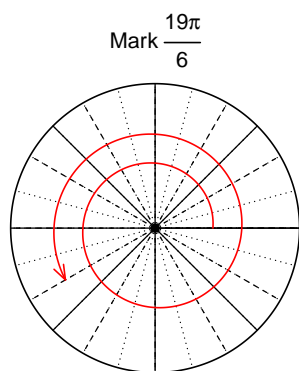


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$L = 89.9$ meters.

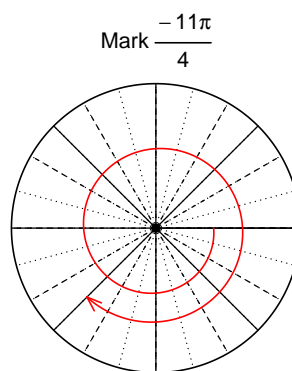
Question 2

Consider angles $\frac{19\pi}{6}$ and $-\frac{11\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{19\pi}{6}\right)$ and $\cos\left(-\frac{11\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(19\pi/6)$

$$\sin(19\pi/6) = -\frac{1}{2}$$



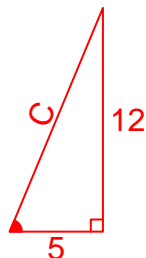
Find $\cos(-11\pi/4)$

$$\cos(-11\pi/4) = \frac{\sqrt{2}}{2}$$

Question 3

If $\tan(\theta) = \frac{-12}{5}$, and θ is in quadrant II, determine an exact value for $\sin(\theta)$.

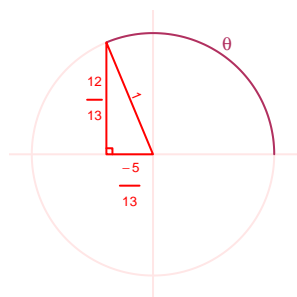
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}5^2 + 12^2 &= C^2 \\ C &= \sqrt{5^2 + 12^2} \\ C &= 13\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\sin(\theta) = \frac{12}{13}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -3.79$ meters, an amplitude of 2.07 meters, and a frequency of 6.89 Hz. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -2.07 \cos(2\pi 6.89t) - 3.79$$

or

$$y = -2.07 \cos(13.78\pi t) - 3.79$$

or

$$y = -2.07 \cos(43.29t) - 3.79$$